ORBIT

OUTLINE

I. BONES OF ORBIT
II. EYELIDS
III. LACRIMAL APPARATUS
IV. FASCIAL SHEATH OF EYEBALL
V. EXTRAOCULAR MUSCLES/EYE MOVEMENTS
VI. STRUCTURE OF EYE
VII. CILIARY GANGLION
VIII. NERVE DAMAGE

- VISION REQUIRES COORDINATED MOVEMENTS OF TWO EYES
- EYES/EYE MOVEMENTS USED DIAGNOSTICALLY
I. BONES OF ORBIT

RIGIDLY LINKED FOR EYE MOVEMENTS

A. BOUNDARIES

1. ROOF
FRONTAL

2. FLOOR
MAXILLARY

3. WALL
ZYGOMATIC

SPHENOID
3. **MEDIAL WALL** - INCLUDES MAXILLARY, LACRIMAL, ETHMOID, FRONTAL & SPHENOID (NASAL CAVITY IS MEDIAL TO MEDIAL WALL OF ORBIT)
BONES OF ORBIT

HEAD CUT IN CORONAL PLANE

RELATIONS OF ORBIT

1) ANTERIOR CRANIAL FOSSA - SUPERIOR TO ROOF

2) MAXILLARY SINUS - INFERIOR TO FLOOR

3) NASAL CAVITY - MEDIAL TO MEDIAL WALL OF ORBIT
B. FORAMINA OF ORBIT

FORAMINA- MOST THINGS ENTER ORBIT FROM MIDDLE CRANIAL FOSSA

1) OPTIC CANAL- IN BASE OF LESSER WING OF SPHENOID BONE, CONTAINS OPTIC NERVE & OPHTHALMIC ARTERY

2) SUPERIOR ORBITAL FISSURE BETWEEN GREATER AND LESSER WINGS OF SPHENOID, CONTAINS III, IV, V1, VI, OPHTHALMIC VEINS
B. FORAMINA OF ORBIT

ORBIT- SERVES AS PASSAGEWAY FOR NERVES, VESSELS TO FACE, SCALP & NASAL CAVITY

1) SUPRAORBITAL NOTCH OR FORAMEN- IN FRONTAL BONE CONTAINS SUPRAORBITAL N., A. and V. FROM V1, OPHTALMIC A. and V.

2) INFRAORBITAL FORAMEN- IN MAXILLARY BONE CONTAINS INFRAORBITAL N., A. and V. FROM V2 & MAXILLARY

3) ZYGOMATICO-FACIAL FORAMEN- IN ZYGOMATIC BONE- ZYGOMATICO-ORB. N., V2,
C. FORAMINA OF ORBIT

1) INFERIOR ORBITAL FISSURE - SLIT BELOW SUP. ORBITAL FISSURE: BETWEEN SPHENOID & MAXILLARY - CONNECT PTERYGOPALATINE FOSSA AND INFRATEMPORAL FOSSA WITH ORBIT - CONTAINS INFRAORBITAL AND ZYGOMATIC N., A. AND V. (V2, MAXILLARY A.)

2) ANT. & POST. ETHMOIDAL FORAMINA - BETWEEN ETHMOID & FRONTAL BONES - CONNECT ORBIT & NASAL CAVITIES - CONTAIN ANT & POST ETHMOIDAL N., A. & V. (V1 & OPHTHALIC A.)

OPENING OF 3) NASOLACRIMAL DUCT - IN MAXILLARY, LACRIMAL BONES & INF. NASAL CONCHA - CONTAINS MEMBRANEOUS NASOLACRIMAL DUCT & TEARS
II. EYELIDS - LAYERS

EYELIDS PROTECT EYE, MOVEABLE, KEEP CORNEA MOIST

1. **SKIN** - CONTAINS EYELASHES (CILIA) & OPENINGS SEBACEOUS, SWEAT GLANDS;

2. **SUBCUTANEOUS LAYER** - CONNECTIVE TISSUE CONTAINS SEBACEOUS GLANDS; OBSTRUCTION = STY OR HORDOLEUM

3. **ORBICULARIS OCULI** (PALPEBRAL PART) - SKELETAL MUSCLE CLOSES EYE, INNERVATED BY VII - PARALYZE ORBICULARIS OCULI - CAN DAMAGE CORNEA

Orient - Eyelid Parasagittal Section

Obstruction of Sebaceous Gland in Subcutaneous Layer = Sty or Hordoleum

**FIGURE 10-10**
Acute hordeolum of upper eyelid.
From Palay, Krachmer, 1997.
4B. **TARSAL PLATE** - Fibrous CT ‘Skeleton’ of Eyelid, Deep to Orbital Septum

**TARSAL PLATE** -
Contains Tarsal Glands
- Keep tears in eye -
Obstruction = Chalazion
4A. ORBITAL SEPTUM - CT LAYER CONTINUOUS WITH PERIOSTEUM OF ORBIT (PERIORBITA)

4C. LEVATOR PALPEBRAE SUPERIORIS MUSCLE - ORIGIN FROM TENDINOUS RING - COMPOSED OF SKELETAL (CN III) & SMOOTH (SYMPATHETICS) MUSCLE PARTS
5) **CONJUNCTIVA** - MEMBRANE COVERING INSIDE OF LID - FUSES TO SCLERA - REFLECTED TO CORNEA OF EYE AT FORNICES

SKIN

FORNIX = ARCH

SUPERIOR CONJUNCTIVAL FORNIX

CORNEA

INFERIOR CONJUNCTIVAL FORNIX
LACRIMAL APPARTUS

A. LACRIMAL GLAND - LOCATED IN SUPEROLATERAL ORBIT - OPENS BY DUCTS (~12) THROUGH CONJUNCTIVA TO SUPERIOR FORNIX - TEARS CONSTANTLY PRODUCED

- TEARS DRAIN THROUGH LACRIMAL PUNCTA TO LACRIMAL SAC TO NASOLACRIMAL DUCT TO INFERIOR MEATUS OF NASAL CAVITY

B. LAC. GLAND INNERVATED BY VII- COMPLEX PATHWAY
IV. FASCIAL SHEATH OF EYE

= TENON’S CAPSULE - THIN MEMBRANE SURROUNDS BACK OF EYE - THICKENINGS - MEDIAL & LATERAL CHECK LIGAMENTS - PREVENT EXCESSIVE ROTATION
V. EXTRAOCULAR MUSCLES

- VOLUNTARY SKELETAL MUSCLES WHICH MOVE EYEBALL

RECTI = STRAIGHT, NAMED FOR SIDES ON WHICH THEY ATTACH TO

OBLIQUEES - MORE COMPLICATED DEVIous SUPERIOR OBLIQUE - ACTS THROUGH PULLEY (TROCHLEA); INFERIOR OBLIQUE - TO FLOOR OF ORBIT
EYE MOVEMENTS

ADDUCT- MOVE MEDIANLY
ABDUCT- LATERALLY
ELEVATE OR RAISE- SUPERIORLY
DEPRESS OR LOWER- INFERIORLY

ROTATE- INVOLUNTARY WHEN TILT HEAD
MEDIAL ROTATE- INTORSION
LATERAL ROTATE- EXTORSION
A. ORIGINS OF EXTRAOCULAR MUSCLES

VIEW OF ENUCLEATED ORBIT - EYEBALL REMOVED; MOST MUSCLES TAKE ORIGIN FROM TENDINOUS RING - RING OF CT SURROUNDING OPTIC CANAL & SUPERIOR ORBITAL FISSURE

NOTE: NOT INFERIOR OBLIQUE - FROM FLOOR OF ORBIT
B. ACTIONS - EYE MOVEMENTS

ACTIONS - MEDIAL RECTUS AND LATERAL RECTUS STRAIGHTFORWARD

LATERAL RECTUS - ABDUCT (VI)

MEDIAL RECTUS - ADDUCT EYE (III)
EYE MOVEMENTS

- ACTIONS OF OTHER MUSCLES COMPLEX

- PULL OF SUP & INF RECTUS AT ANGLE WITH LINE OF SIGHT

CAN ANALYZE VECTORS
EYE MOVEMENTS

SUP RECTUS (III)  INF RECTUS (III)

RAISE
ADDUCT
MED ROTATE

LOWER
ADDUCT
LAT ROTATE
EYE MOVEMENTS

ACTION OF OBLIQUE MUSCLES COMPLEX (COUNTERINTUITIVE)

SUP OBLIQUE (IV) - ACTS THROUGH PULLEY (TROCHLEA) LIKE MUSCLE ON NOSE

INF OBLIQUE (III) - ORIGIN FROM FLOOR OF ORBIT- LIKE MUSCLE ON EAR

SUP OBLIQUE

INF OBLIQUE

LOWER ABDUCT MED ROTATE

RAISE ABDUCT LAT ROTATE
EYE MOVEMENTS DIAGRAM
VI. EYE- STRUCTURE OF EYEBALL- 3 LAYERS

1. FIBROUS LAYER - SCLERA, CORNEA
2. VASCULAR LAYER - IRIS, CILIARY BODY, CHOROID
3. RETINA
EYE- STRUCTURE OF EYEBALL- FIBROUS LAYER

A) SCLERA- TOUGH, SMOOTH FIBROELASTIC CT LAYER SURROUNDS EYE- PIERCED BY VESSELS & NERVES FUNCTIONS- MAINTAIN EYE SHAPE, ATTACHMENT OF MUSCLES

B) CORNEA- AVASCULAR, TRANSPARENT LAYER OVER ANTERIOR EYE -AIDS IN FOCUSSING LIGHT; IRREGULARITIES->ASTIGMATISM
A. CHOROID-
HIGHLY
VASCULAR,
PIGMENTED:
FUNCTIONS:
PROVIDE O2,
NUTRIENTS TO
OTHER LAYERS
B. CILIARY BODY
ATTACHES
SUSPENSORY
LIGAMENTS OF LENS

CILIARY MUSCLES-
SMOOTH MUSCLES
CONTACT PRODUCE-
>RELAXATION OF
LIGAMENTS-
>THICKENING LENS

ACCOMODATION-
THICKEN LENS FOR
NEAR VISION
PARASYMPATHETIC
CONTROL- III
EYE- STRUCTURE OF EYEBALL- VASCULAR LAYER

C. IRIS - PIGMENTED, CONTRACTILE LAYER SURROUNDING PUPIL

DILATOR PUPIL-RADIAL SMOOTH MUSCLE; SYMPATHETICS

CONSTRICCTOR PUPIL-CIRCULAR SMOOTH MUSCLE; PARASYMPATHETICS
CONTAINS RODS & CONES PHOTOSENSITIVE CENTRAL ARTERY OF RETINA- BRANCH OF OPHTHALMIC ART. NO ANASTOMOSES; OCCLUSION RESULTS IN BLINDNESS

CENTRAL ARTERY OF RETINA

BRANCHES OF CENTRAL ARTERY AND VEIN OF RETINA

OPTIC NERVE (DISC)

OPHTHALMOSCOPE VIEW
DURA & SUBARACHNOID SPACE (CSF) EXTEND AROUND OPTIC NERVE; CSF CAN EFFECT VISION; DIAGNOSE BY EYE EXAM

NOTE:

SUBARACHNOID SPACE EXTENDS TO BACK OF EYE

CSF IN SUBARACH SPACE

optic nerve
CILIARY GANGLION-
PARASYMPATHETICS OF
OCULOMOTOR N (III) INN
1) CILIARY MUSCLES
2) SPHINCTER
(CONSTRICITOR) PUPILLAE
TRAVEL IN SHORT CILIARY
NERVES CONTAIN
PARASYMPATHETICS

NOTE: LONG CILIARY NERVES
BRANCHES OF V1
(OPTHALMIC) - SENSORY TO
CORNEA
VIII. NERVE DAMAGE

A. ABDUCENS (VI) NERVE DAMAGE

ABDUCENS (VI): AT REST MEDIAL STYLABISMUS (CROSS-EYED) DUE TO DAMAGE/PARALYZE LATERAL RECTUS
B. TROCHLEAR (IV) NERVE DAMAGE

NERVE DAMAGE
TROCHLEAR (IV):
INABILITY TO TURN EYE DOWN AND OUT

PATIENT CANNOT LOOK

Superior oblique
C. OCULOMOTOR (III) NERVE DAMAGE

AT REST

- LATERAL STRABISMUS (WALL-EYED) DUE TO PARALYZE MEDIAL RECTUS

ALSO

- PTOSIS-DROOPING EYELID- PARALYZE LEV. PALPEBRAE SUPERIORIS
- DILATED PUPIL- PARALYZE PUPILLARY CONSTRICCTOR
GUIDE TO ORBIT PROSECTIONS

Orbit is dissected from floor of anterior cranial fossa.

Diagram of lateral view:

- Superficial Dissection - shows structures leaving orbit (V1 branches), muscle of upper eyelid (lev.palp.sup), lacrimal gland.
- Deep Dissection.
V. EXTRAOCULAR MUSCLES

- VOLUNTARY SKELETAL MUSCLES WHICH MOVE EYEBALL

RECTI = STRAIGHT, NAMED FOR SIDES ON WHICH THEY ATTACH TO

OBLIQUES - MORE COMPLICATED DEVIous
SUPERIOR OBLIQUE - ACTS THROUGH PULLEY (TROCHLEA);
INFERIOR OBLIQUE - TO FLOOR OF ORBIT

LAT.  MED.  INF.  SUP.  BACK OF EYE
SUPERFICIAL ORBIT

- Anterior ethmoidal artery and air cells
- Supraorbital artery and nerve
- Frontal sinus, open
- Levator palpebrae superioris
- Superior
- Lacrimal
- Frontal nerve
- Trochlear nerve (CN IV)
- Posterior ethmoidal air cell and artery
- Anterior clinoid process
- Anterior communicating artery
- Anterior cerebral artery
SUPERFICIAL ORBIT
PROSECTION: SUPERFICIAL ORBIT

Roof of orbit removed, otherwise still intact

I - Olfactory tract
II - Optic nerve
PS - Pituitary stalk
CG - Crista galli of ethmoid bone
SO - Superior oblique muscle
LPS - Levator Palpebrae Superioris muscle
FN - Frontal nerve (V1)
LG - Lacrimal gland
LN - Lacrimal nerve (V1)
OA - Ophthalmic artery
ICA - Internal Carotid artery
III - Oculomotor nerve
SUPERFICIAL ORBIT

Roof of orbit removed,
Orbital fat removed
PROSECTION OF ORBIT - Deep Dissection

LPS + SR - LEVATOR PALPEBRAE SUPERIORIS AND SUPERIOR RECTUS MUSCLES REFLECTED
IV - TROCHLEAR NERVE
SO - SUPERIOR OBLIQUE MUSCLE
AEN - ANTERIOR ETHMOIDAL NERVE
FN - FRONTAL NERVE
CG - CILIARY GANGLION
SCN - SHORT CILIARY NERVES
LN - LACRIMAL NERVE
ON - OPTIC NERVE
ICA - INTERNAL CAROTID ARTERY
DEEP ORBIT

CG = CILIARY GANGLION

SCN= SHORT CILIARY NERVES
LATERAL DISSECTION
ANTERIOR DISSECTION OF ORBIT

See Inferior rectus, Inferior Oblique
ORBIT AND CAVERNOUS SINUS

BRANCHES OF V1 TO NASAL CAVITY

ANT. ETTHMOIDAL NERVES